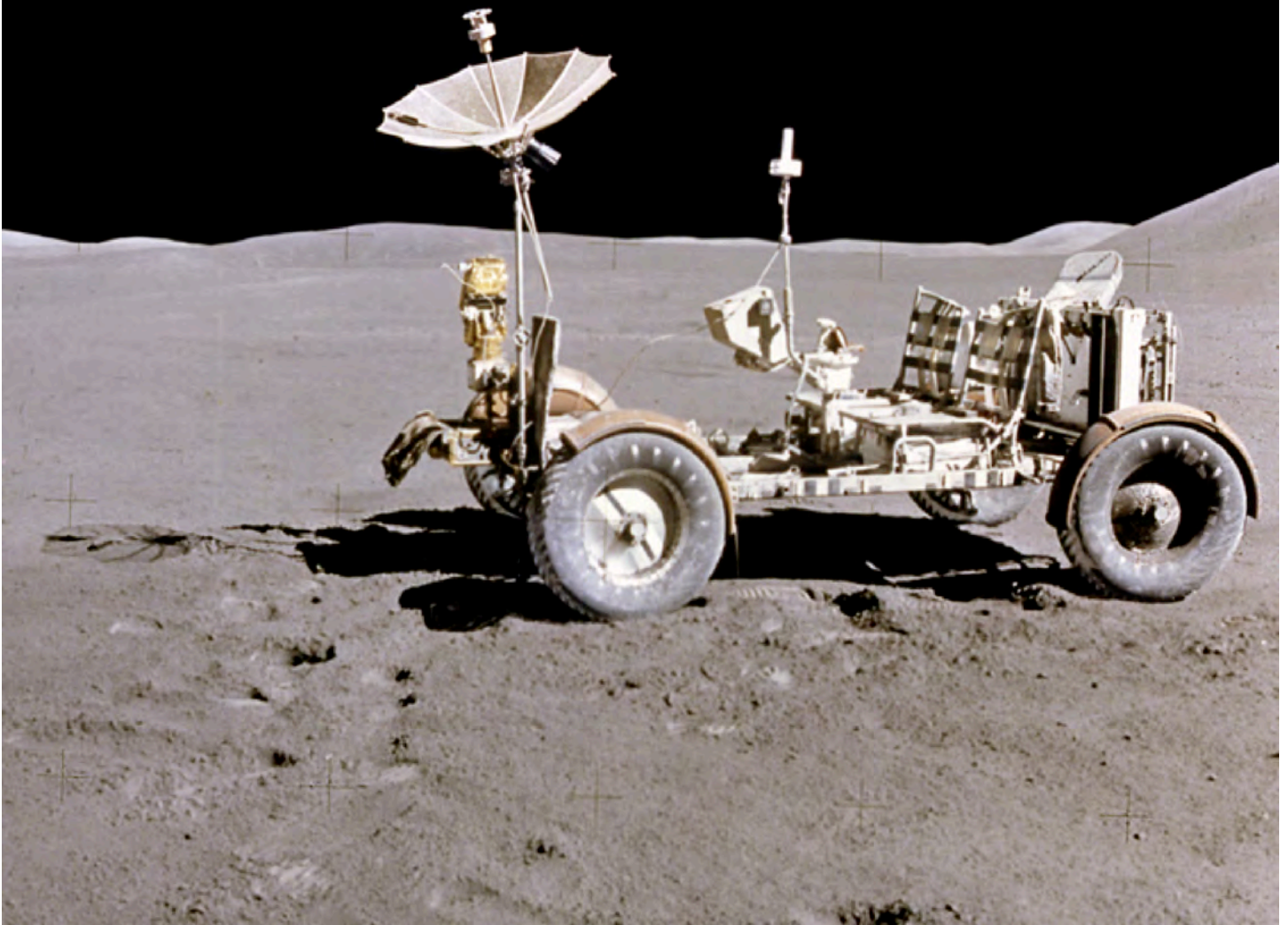National Aeronautics and Space Administration

NASA Great Moonbuggy Race Volunteer Guide

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Introduction

Thank you for your support of the Annual NASA Great Moonbuggy Race!
Without the volunteers, the race would not be possible!

About the Race:

Students are required to design a vehicle that addresses a series of engineering problems that are similar to problems faced by the original Lunar Rover or Moonbuggy team.

Each Moonbuggy will be human powered and carry two students, one female and one male, over a half-mile simulated lunar terrain course including "craters," rocks, "lava" ridges, inclines, and "lunar" soil.

Moonbuggy entries are expected to be engineering test models, rather than final production models. Each student team of six members is responsible for building its own buggy.

As a part of the competition, and prior to course testing, the unassembled Moonbuggy entries must be carried to the course starting line, with the unassembled components contained in a volume of 4 ft × 4 ft × 4 ft (dimension requirements similar to those for the original Lunar Roving Vehicle). At the starting line, the entries will be assembled and readied for course testing and evaluated for safety. Assembly occurs prior to the first course run.

The top three winning teams in each division (high school and college divisions) are those having the shortest total times in assembling their Moonbuggies and traversing the terrain course. Each team is permitted two runs; the shortest course time is used along with the assembly time for the final team score.

Photo Compliments of Bruce Askins

General Information

The Great Moonbuggy Race Website: http://moonbuggy.msfc.nasa.gov

Race Dates: High Schools, Friday
                    Colleges, Saturday

Race Location: U.S. Space and Rocket Center
                    One Tranquility Base
                    Huntsville, AL 35805

The Great Moonbuggy Race Contacts:

Project Coordinator:	Durlean Bradford
Technical Coordinator:	Sabrina Pearson
Volunteers:	Karla Miller

What do I need to bring to the race?

Listed are items you may want to consider bringing with you:
- Rain Jacket
- Umbrella (for sun or rain)
- Lawn Chair
- Sunscreen
- MSFC badge (if you have one)
- Moonbuggy Badge (given the day of the race)
- Meal Ticket (given the day of the race)

What do I do when I get to the race?

1. Wear your Moonbuggy T-shirt on the day you will be judging.
2. Please arrive no later than 20 minutes prior to the start of your shift!
   (7:30–7:40 a.m. for the morning shift and 11:30–11:40 a.m. for the afternoon shift. Start time for the race on Saturday is ONE HOUR LATER) in order to obtain items needed and then report to position.
3. Check in at the Administrative Tent located in the east parking lot. This is the parking lot in front of the Space Shuttle. Morning Shift will pick up items needed, such as, stopwatch, rake, shovel, score sheet, walkie-talkie, etc. Afternoon shift will return the items to the Administrative Tent area. Please see the Position Information section to know what items to pick up.
4. Go to your assigned location, set up a judging area where you can clearly see all points of your judging section, and wait for the race to begin. Please listen for walkie-talkie confirmation that you are ready.
5. In order to assure continuity in judging, first and second "shift" volunteers should discuss how the obstacle/area has been judged. This will provide for consistent judging throughout the day.
6. Lunch tickets will be on the back of your badge. Lunches are available from 11:30 a.m.–1:00 p.m. in the AstroTrek building (dome tent building behind the Space Shuttle). We suggest you coordinate picking up lunches during change in shifts of volunteers.

7. **Score sheets and judging information are for the volunteers use only.** These items should not be shared with the teams or general public. Score sheets should be delivered to the Scorekeeper's Tent.
8. Water will be provided during the race. The water truck will come around for volunteers.
9. Notify via walkie-talkie if you should need to leave your station for any reason.
10. Please note that the walkie-talkies are for official use. As walkie-talkies are located throughout the course, **teams and general public will hear what is said on the walkie-talkies. Please be professional.**

Safety
(All Judges: Please READ)

Safety is key to the Moonbuggy Race every year, however, each year we learn new safety techniques that should be followed.

1. Please report any safety issues as soon as possible.
2. Teams will be briefed on all safety prior to the race.
3. While buggies are attempting the course, remind spectators, teams, and participants to be safe. ("Be careful," "Take this one a little slower," "Watch your hands," etc.)
4. Drivers should have all body parts covered, i.e. gloves, long pants, etc.
5. Loose pants legs should be taped down.
6. Each team will develop a signal system to ensure their hands are clear of the chain.
7. **Judges may STOP the race if necessary in order to prevent an unsafe act.**

Issues to watch for:

1. Hands/Fingers in the chain area to replace a broken or fallen chain. Many will pedal in order to help fix the chain. This is dangerous; however, it's the easiest way to get the chain back on.
2. Toppling Buggies. Tall buggies tend to topple on some of the obstacles.
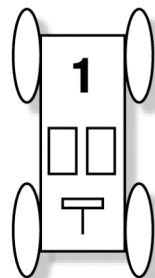3. High Speeds and Sharp Turns.
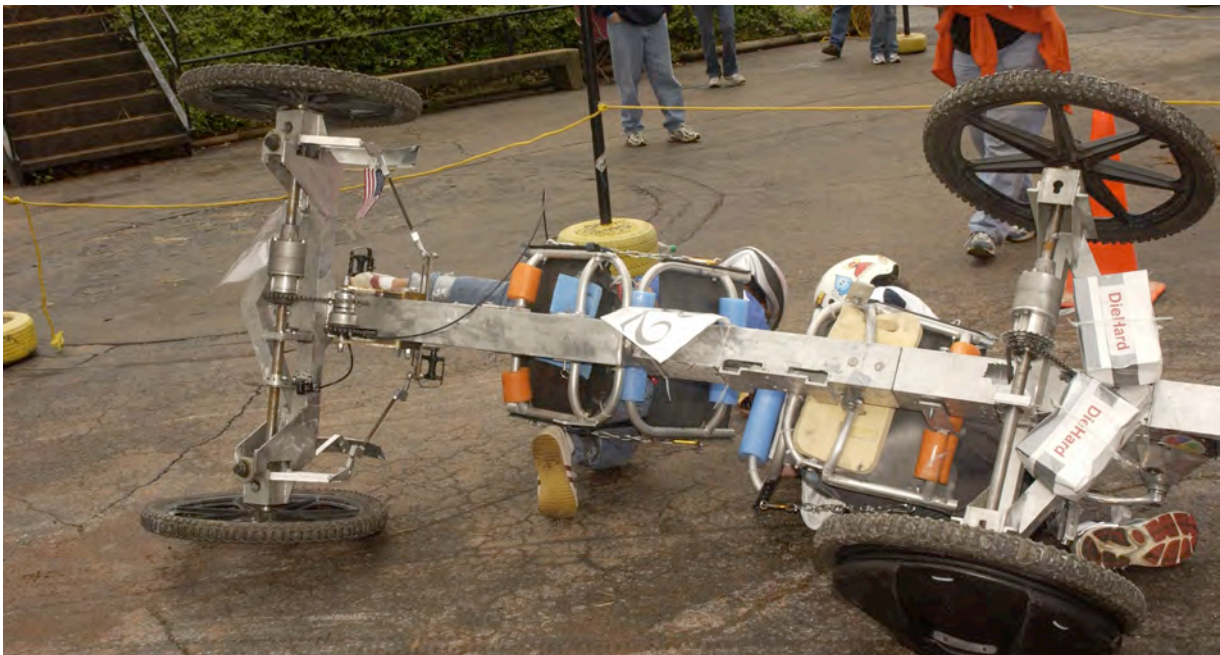
The Race
(Flow Chart)

The following flow chart demonstrates the order in which the Moonbuggies compete.

Moonbuggy Flow Chart

Start

End

The announcer calls the moonbuggy to the late start area. The buggy leaves the parking lot and goes to the late start area.

After First Run
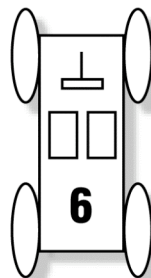
After completion of the first run, the moonbuggy will head back to the parking area. It may go to the pit area for repair. The completion of the second run marks the end of the day.

1

6

Disabled Moonbuggy

Pit Areas for Repairs

The moonbuggy undergoes a precondition check to ensure it has all necessary components and a safety check. During the second run, bypass the next step.

2

5
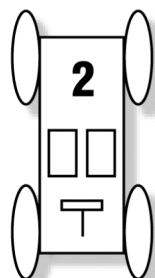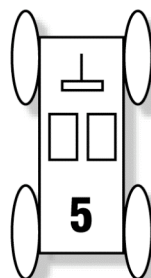
After completion of the course, the moonbuggy will undergo a final condition check to ascertain if it lost any required components.

Disabled Moonbuggy

First Run

Second Run

Disabled Moonbuggy

During the second run, bypass this step. For the first run, buggies will undergo an assembly check to ensure it meets all engineering requirements.

3

4
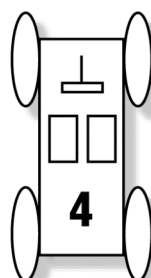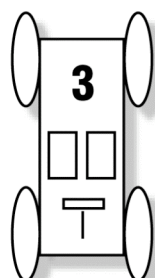
The moonbuggy will race over a course of seventeen obstacles. There will be two judges at each obstacle. If the buggy is disabled or unable to complete the course it can be pulled off.

4

Position Locations

Obstacle Judges:
The map below is marked with each Obstacle Judge location.

Announcer and Announcer's Assistant:
The Announcer and Announcer Assistant will be located at the start and finish of the race, generally around Obstacles 1 and 17.

Assembly Judges:
The Assembly Judges will be positioned behind the mound at the tail of the Space Shuttle, close to the Habitat Building.

Late Start Penalty Judge:
The Late Start Penalty Judge will be located at the gate entrance near the Habitat Building.

Final Condition Judge:
The Final Condition Judge will be positioned at the end of the race, after Obstacle 17.

Pre-Condition Judge:
The Pre-Condition Judge will be located after the Assembly Judge and before the Start Line near the back side of the Space Shuttle.

Scorekeepers:
The Scorekeepers will be under the small tent in front of the AstroTrek Building and to the side of the Space Shuttle. This is near the Start Line.

Starter, Timer One, Timer Two, Timer Back-up:
These positions will all be located at the start/finish line.

Administrative Tent and Back-up Judges:
The Administrative Tent and Back-up Judges will all meet in the tent. The Back-up Judges may be assigned to any volunteer location.
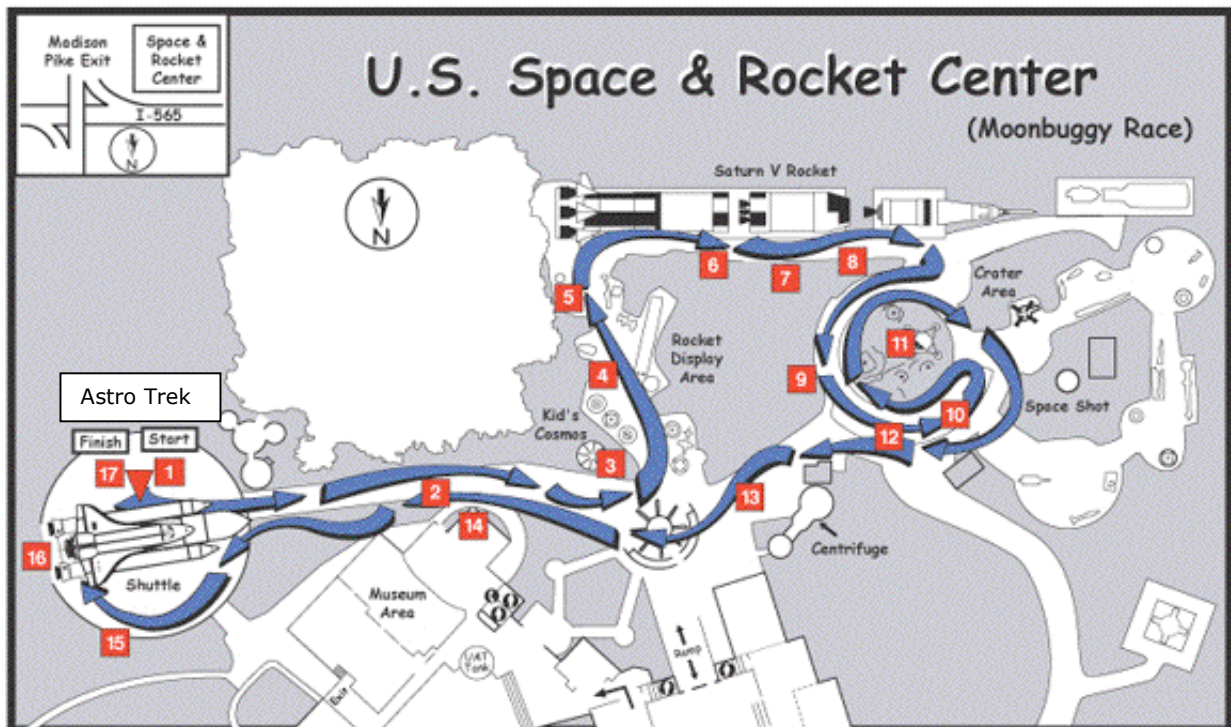
Crosswalk Guards: See the circled numbers on the map below
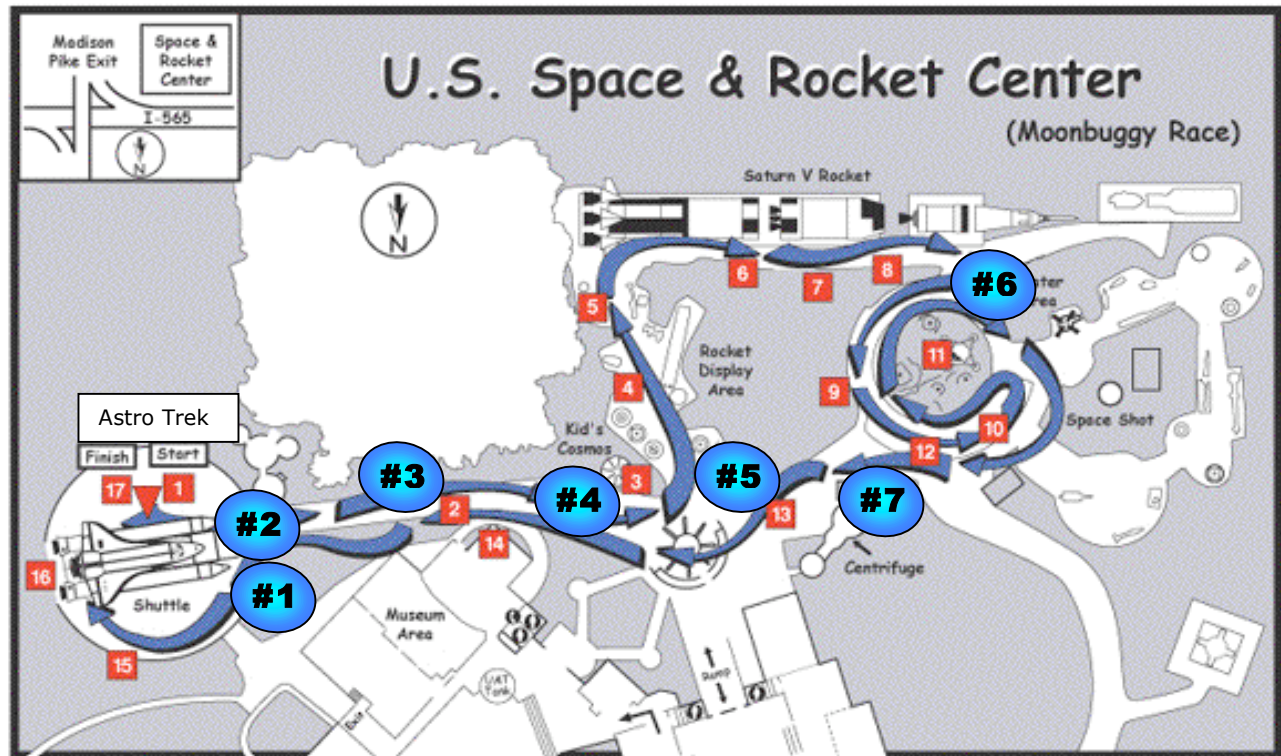
Crosswalk Guard #1 will control pedestrian traffic as the Moonbuggies start the race and also as they proceed to obstacle 15 and the finish line.

Crosswalk Guard #2 will be at Space Shuttle nose after Obstacle 1 and will control pedestrian traffic.

Crosswalk Guard #3 will be located above Obstacle 2 and will control pedestrian traffic.

Crosswalk Guard #4 will be located by the Kid's Cosmos area and will control pedestrian traffic.

Crosswalk Guard #5 will be located by the Saturn IB will assist with the pedestrian traffic flow in the area, as well as near the stairs.

Crosswalk Guard #6 will be located at the end (third stage) of the Saturn V Rocket and will control pedestrian traffic when a buggy makes the turn and will monitor activities on the upper field and lunar area.

Crosswalk Guard #7 will be located in the area of Obstacle 12 and will assist with traffic flow from the Space Shot and will monitor the stairs from the upper field.

Position Information/Rules/Duties/Sample Score Sheets

Safety Procedures/MSAT

The Safety Volunteer will need a walkie-talkie and a score sheet for the race.

1. Please work near the Pre-Condition Judge to check for safety requirements. It may be a good idea to work with the Assembly Judge for any structural issues.
2. A Signal System between the two riders is to be developed to ensure hands are clear of the chain. Each team shall develop their own form of communication. They will be asked to describe their communication plan to the MSAT member and the Starter prior to the start of the race.
3. Please remind teams of all safety concerns such as:
   a. Hands/Fingers in the chain area to replace a broken or fallen chain. Many will pedal in order to help fix the chain. This is dangerous; however, it's the easiest way to get the chain back on.
   b. Toppling Buggies. Tall buggies tend to topple on some of the obstacles.
   c. High Speeds and Sharp Turns.
   d. A buggy must be removed from the course should there be any blood or bodily fluids.
   e. Drink plenty of water before and after the race.
4. **All items on the score sheet are required before a team may race!**
5. First Run score sheets will be picked up by a Runner. Second Run score sheets should be dropped off at the Scorekeeping Tent after the race is complete.

Safety Sample Score Sheet

Safety
High School Division

School Number/Name	Penalties: All Items Required to Proceed									Reason for any Disqualify
	Goggles	Helmet	Long Pants	Shoes/ Socks Shirt	No Sharp Edges	Seat Restraints	Hands Clear of Chain	Taping Loose Clothing	Other	
#1. Autauga County Technology Center (AL) I										
#2. C.E. King High School/AFJROTC (TX) I										
#3. Autauga County Technology Center (AL) II										
#4. C.E. King High School/AFJROTC (TX) II										
#5. Calloway County High School (KY)										
#6. Carlisle County High School (KY)										
#7. Columbia Academy (TN)										
#8. DeSoto High School (KS) I										
#9. Erie High School (KS) I										
#10. DeSoto High School (KS) II										
#11. Erie High School (KS) II										
#12. Fairhope High School (AL) I										
#13. Floresville High School (TX)										
#14. Fairhope High School (AL) II										
#15. Flinthills High School (KS) (Exhibition Only)										
#16. Franklin County High School (TN) I										
#17. Graves High School (KY) I										
#18. Franklin County High School (TN) II										
#19. Graves High School (KY) II										
#20. Huntsville Center for Technology (AL) I										
#21. Huntsville High School (AL)										
#22. Huntsville Center for Technology (AL) II										
#23. Indianapolis Public Schools (IN) I										
#24. Madison County Career Center (AL) I										
#25. Indianapolis Public Schools (IN) II										
#26. Levy County High Schools (Viewing Only)										
#27. Madison County Career Center (AL) II										
#28. Memphis Catholic High School (TN)										
#29. Murray High School (KY)										
#30. New Century Technology High (AL)										
#31. New Orleans Area Schools (Exhibition Only)										

Moonbuggy Announcer and Announcer's Assistant

The Announcer's Assistant provides the announcer and all judges with information on where the Moonbuggy is located on the course and communicates which buggies are next, cancelled, no show, or disqualified. The Announcer's Assistant will also keep final times.

The Announcer's Assistant will need the packet containing team and sponsor information, as well as a walkie-talkie.

1. You will be asked to begin the race for each buggy. Please announce: *This is the official call for Team #xx, "Name of School" to come to the start line.* Repeat this one additional time.
    A late start Penalty Judge will be located by a gate by the Space Camp Habitat to determine if the Moonbuggy has checked in within five minutes of the buggy being called.
2. For the first run, the Assembly Judge will ask the Announcer to call a team to come to the start line after assembly is complete.
3. For the second run, the Starter Volunteer alerts the Announcer when the next buggy should be called to the starting line.
4. During slow periods, feel free to announce general information as needed, and any facts from the announcer folder. We especially want to spend time in thanking our SPONSORS AND PARTNERS.
5. Welcome any VIP's that are in attendance. You will be provided with this information.

The Great Moonbuggy Race Sponsors—Visit the website
http://moonbuggy.msfc.nasa.gov

Late Start Judge Procedures

The Late Start Judge is responsible for ensuring the Moonbuggy is located in the holding area five minutes after it is called to it by the announcer. There is one Late Start Judge per shift.

The Late Start Judge will need a score sheet, a walkie-talkie, and a stopwatch for the race.

1. Start the clock when the Announcer has called for the next buggy to approach the starting line.
2. A team receives a 4 minute penalty for being 5 minutes late. Once a team is 10 minutes late, it will be disqualified.
3. If students request driver substitutions, tell them to notify the Starter at the beginning of the race.
4. **Walkie-Talkie Report:** If a vehicle is not at the agreed upon location (through the "rolling gates" waiting for the Crossing Guard or Assembly Judges to request they proceed to an assembly area, and usually marked with a stripe of red tape) report their Vehicle #xx, any incurred penalty, or
5. First Run score sheets will be picked up by a Runner. Second Run score sheets should be dropped off at the Scorekeeping Tent after the race is complete.

Late Start Sample Score Sheet

**Call for Start/Late Start
High School Division**

ADMIN / PITS TENT

RUN #:

School Number/Name	5:00 Minute Late Start Penalty (4:00 each)	10 Minute Late Start Disqualification
#1. Autauga County Technology Center (AL) I		
#2. C.E. King High School/AFJROTC (TX) I		
#3. Autauga County Technology Center (AL) II		
#4. C.E. King High School/AFJROTC (TX) II		
#5. Calloway County High School (KY)		
#6. Carlisle County High School (KY)		
#7. Columbia Academy (TN)		
#8. DeSoto High School (KS) I		
#9. Erie High School (KS) I		
#10. DeSoto High School (KS) II		
#11. Erie High School (KS) II		
#12. Fairhope High School (AL) I		
#13. Floresville High School (TX)		
#14. Fairhope High School (AL) II		
#15. Flinthills High School (KS) (Exhibition Only)		
#16. Franklin County High School (TN) I		
#17. Graves High School (KY) I		
#18. Franklin County High School (TN) II		
#19. Graves High School (KY) II		
#20. Huntsville Center for Technology (AL) I		
#21. Huntsville High School (AL)		

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Vehicle Assembly Judge Procedures

Assembly Judges are expected to measure the volume, clearance, and width of the vehicle. Record the vehicle assembly time and check that the Moonbuggy can be carried. There are four Assembly Judges per shift (morning shift only).

The Assembly Judges will need a score sheet, a walkie-talkie, measuring devices, and a stop watch for the race.

1. As with all areas, the key to assembly judging is consistency. Once you make a decision on how to judge a buggy, please judge all subsequent buggies according to the same standards.
2. For the 4 ft size check of the Moonbuggy, you may attempt to work the cube around the buggy; however, please refrain from bending or warping it to try and make the buggy fit in the appropriate space. This is a judgment call, so please be consistent.
3. Assembly timing begins on the word "go". Timing does not end until all tools and other assembly implements are placed in the designated area and both team members are seated in the buggy. Team members are considered seated when they are fully in the buggy with helmets, all padding, and seat belts attached. They do not have to have feet in restraints. Please explain this in detail to each team BEFORE assembly begins.
4. After assembly is complete and the time is recorded, you may ask the team to wait near the starting area. They should not leave the starting area. The unofficial maximum number of buggies you should have waiting to start is five. Please note that it is not necessary to have multiple buggies waiting, but it is encouraged. Please be sure to let the Announcer or Announcer's Assistant know when you are ready for the next buggy to be called for assembly.
5. There can only be one weight penalty.
6. Please remind participants of safety procedures (ex: DO NOT fix a chain while pedaling).
7. Drivers are expected to carry the buggy 20 ft without setting it down. The carry is NOT timed.
8. There is a late start penalty if they are not approaching assembly once they are called. The late start judge notes any late starts.
9. **Walkie-Talkie Report**: Identify yourself as Assembly, state Vehicle #xx, any incurred penalties, and assembly time.
10. Please drop off score sheets at the Scorekeeping Tent upon completion of judging.

Vehicle Assembly Judge Sample Score Sheet

Vehicle Assembly
High School Division

School Number/Name	PENALTIES (2:00 each)				Passenger Disqualification (Require 1 male, 1 female driver)	Assembly Time (min:sec)
	Weight (carry)	Volume	15" Clearance	4' Assembled Width		
#1. Autauga County Technology Center (AL) I						
#2. C.E. King High School/AFJROTC (TX) I						
#3. Autauga County Technology Center (AL) II						
#4. C.E. King High School/AFJROTC (TX) II						
#5. Calloway County High School (KY)						
#6. Carlisle County High School (KY)						
#7. Columbia Academy (TN)						
#8. DeSoto High School (KS) I						
#9. Erie High School (KS) I						
#10. DeSoto High School (KS) II						
#11. Erie High School (KS) II						
#12. Fairhope High School (AL) I						
#13. Floresville High School (TX)						
#14. Fairhope High School (AL) II						
#15. Flinthills High School (KS) (Exhibition Only)						
#16. Franklin County High School (TN) I						
#17. Graves High School (KY) I						
#18. Franklin County High School (TN) II						
#19. Graves High School (KY) II						
#20. Huntsville Center for Technology (AL) I						
#21. Huntsville High School (AL)						
#22. Huntsville Center for Technology (AL) II						
#23. Indianapolis Public Schools (IN) I						

Indicate penalties or disqualification by a " ✔ " or "x" in appropriate location

Pre-Condition and Final Condition Judge Procedures

The Pre-Condition Judge ensures that the Moonbuggy <u>begins</u> the race with all the components required in the rules. Judges check for the antenna, flag, and other accessories.

The Final Condition Judge ensures that the Moonbuggy <u>completes</u> the race with all components intact as included by the pre-condition judge.

The Pre-Condition and Final Condition Judges will need to pick up a walkie-talkie and a score sheet for the race.

1. Please confer with the Pre- or Final Condition Judge before a shift begins to determine judging details. We're simply looking for judging consistency between the two runs.
2. Rules have been written to incur a penalty of 0:30 seconds for loss of any fenders or other items
3. A Puerto Rican or U.S. flag is acceptable.
4. A real camcorder is an acceptable substitute for a simulated TV camera.
5. **Walkie-Talkie Report:** Identify as Pre-Condition or Final Condition, Vehicle #xx, any incurred penalties, and a total penalty time.
6. Safety: Please remind participants to drink plenty of water before and after the race. Remind participants to slow their heart rate down at an appropriate pace.
7. First Run score sheets will be picked up by a runner. Second Run score sheets should be dropped off at the Scorekeeping Tent.

Pre-Condition and Final Condition Sample Score Sheet

Pre-Condition
High School Division

RUN #:

School Number/Name	Penalties (0:30 each)							Total Pre-condition Penalties (min:sec)
	Dust Abatement (Fenders)	Battery #1	Battery #2	High Gain Antenna	TV Camera	Flag	Radio/ Display Console	
#1. Autauga County Technology Center (AL) I								
#2. C.E. King High School/AFJROTC (TX) I								
#3. Autauga County Technology Center (AL) II								
#4. C.E. King High School/AFJROTC (TX) II								
#5. Calloway County High School (KY)								
#6. Carlisle County High School (KY)								
#7. Columbia Academy (TN)								
#8. DeSoto High School (KS) I								
#9. Erie High School (KS) I								
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#16. Franklin County High School (TN) I								
#17. Graves High School (KY) I								
#18. Franklin County High School (TN) II								
#19. Graves High School (KY) II								
#20. Huntsville Center for Technology (AL) I								
#21. Huntsville High School (AL)								
#22. Huntsville Center for Technology (AL) II								

Indicate penalties or disqualification by a " ✓ " or "X" in appropriate location

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Starter Procedures

The Starter is responsible for starting the race. During the second run, the Starter should request that the Announcer or Announcer's Assistant to call the next buggy.

The Starter will need to pick up a score sheet, a walkie-talkie, and the bull horn for the race.

1. Start each team by saying "Ready, Set, Go." At the word "Go", sound the horn into the walkie-talkie. Announce via walk-talkie that Vehicle #xx has started.
2. You will start a second buggy when the previously started buggy has crossed Obstacle 11 or 12, depending on their speed. (If there is a slow buggy on the course and a fast buggy is started when the slow buggy is at obstacle 11 or 12, the fast one will overtake the slow buggy before the finish line.) Listen for walkie-talkie reports for Obstacles 11 and 12. Do not have more than two buggies on the course at any time.
3. For the first run, the Vehicle Assembly Judges will send you a buggy to start. During the second buggy runs, however, Assembly Judges' jobs will be complete, and you will request (to the Announcer) that a buggy begin movement toward the start line once the previous buggy has started the race.
4. If any team has a substitute passenger, note their last name in the score sheet.
5. First Run score sheets will be picked up by a Runner. Second Run score sheets should be dropped off at the Scorekeeping Tent after the race is complete.

NOTE: Teams may go underneath Shuttle (in shade) if needed while they wait at the start line for their run to start.

Starter Sample Score Sheet

Starter
High School Division

RUN #:

School Number/Name	Driver Substitute	Driver Substitute
#1. Autauga County Technology Center (AL) I		
#2. C.E. King High School/AFJROTC (TX) I		
#3. Autauga County Technology Center (AL) II		
#4. C.E. King High School/AFJROTC (TX) II		
#5. Calloway County High School (KY)		
#6. Carlisle County High School (KY)		
#7. Columbia Academy (TN)		
#8. DeSoto High School (KS) I		
#9. Erie High School (KS) I		
#10. DeSoto High School (KS) II		
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#16. Franklin County High School (TN) I		
#17. Graves High School (KY) I		
#18. Franklin County High School (TN) II		
#19. Graves High School (KY) II		
#20. Huntsville Center for Technology (AL) I		

Administrative Tent/Runner

Administrative Tent/Runners are responsible for helping with shift changes and dealing with difficulties as they occur, assisting with volunteer check-in, and distributing water to the volunteers. There are three Administrative Tent/Runners per shift.

Crosswalk Guards

Guards are responsible for keeping the course safe, keeping clear of pedestrians, and watching for oncoming Moonbuggies. There are seven Crosswalk Guards per shift.

Timer One/Timer Two/Back-up Timer

Each Timer is responsible for accurately timing a Moonbuggy as it competes in the race. There are three Timers per shift.

Timers will need to pick up a total of 4 stopwatches, a walkie-talkie, and a score sheet for their shift. Timer 1 records the time for the first buggy. Timer 2 records the time for the next buggy. The two Timers will alternate keeping time. The Timer Back-up has two stopwatches in order to keep time for up to two buggies on the course at one time. Timer 1 or Timer 2's recorded times are used unless there is a problem with the stopwatch.

Timer Sample Score Sheet

Timer
High School Division

RUN #:

School Number/Name	Unoffical Raw Run Time (minutes:seconds)
#1. Autauga County Technology Center (AL) I	
#2. C.E. King High School/AFJROTC (TX) I	
#3. Autauga County Technology Center (AL) II	
#4. C.E. King High School/AFJROTC (TX) II	
#5. Calloway County High School (KY)	
#6. Carlisle County High School (KY)	
#7. Columbia Academy (TN)	
#8. DeSoto High School (KS) I	
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#20. Huntsville Center for Technology (AL) I	
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#22. Huntsville Center for Technology (AL) II	
#23. Indianapolis Public Schools (IN) I	
#24. Madison County Career Center (AL) I	
#25. Indianapolis Public Schools (IN) II	
#26. Levy County High Schools (Viewing Only)	
#27. Madison County Career Center (AL) II	
#28. Memphis Catholic High School (TN)	

The score sheet will be picked up after every division run.

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Obstacle Judge Procedures

There are 17 obstacles located throughout the course. Obstacles range from sand pits to gravel "speed bumps." The Obstacle Judge will judge whether the Moonbuggy satisfactorily clears the obstacle and then reports the results. Each obstacle is staffed with two judges.

Obstacle Judges will need a walkie-talkie, a score sheet, a shovel and/or rake for their shift.

Once you decide to judge your obstacle in a certain manner, please do so for each Moonbuggy. In addition, please be sure to maintain the obstacle using the rakes and shovels that are provided.

Safety: If a dangerous situation arises, please take any necessary steps to avoid further injury. Report any situation on the walkie-talkie by asking HEMSI or an appropriate official to respond to your obstacle immediately. A team must be pulled from the course if there is a loss of blood or body fluids and/or the judge deems one or both team members unable to safely continue the course. The buggy should be moved to the side of the course so that the subsequent buggy will not be affected.

There are two possible penalties: A touch penalty and an obstacle penalty.
- A buggy may receive either OR both of these penalties.
- No buggy can receive more than one touch or one obstacle penalty at each obstacle.
- An obstacle extends half way from the last obstacle to half way to the next obstacle. (Please check with the Obstacle Judge before and after your obstacle to determine a halfway point.)

- ❖ Touch Penalty: The purpose of the touch penalty is to encourage participants to rely on their buggy's design when attempting the obstacles.
  - Using the railing, the ground, or any object with the intent to facilitate advancement through the course is considered a penalty.
  - Accidental contact that yields no advantage should **not** result in a penalty.
  - Participants' use of hands in a wheelchair motion with the buggy's tires to move ahead, is acceptable and should **not** result in a penalty.

- ❖ Obstacle Penalty: The purpose of the obstacle penalty is to encourage participants to meet the challenge of each obstacle.
  - ➤ The buggy should enter the obstacle on the center line and keep the wheels within the obstacle at all times.
 - ➤ The buggy should also not have any significant contact with ropes or cones.

- ❖ Disqualification: If a team does not even attempt an obstacle or tries to avoid it completely, please report on the radio that they are disqualified.

- ❖ **Walkie-Talkie Reporting:** After a buggy passes your area, identify as Obstacle #xx, Vehicle #xx, and any incurred penalties. (For example: "Obstacle 3, Buggy/Vehicle #xx, one touch penalty, one obstacle penalty.")

- ❖ First Run score sheets will be picked up by a runner. Second Run score sheets should be dropped off at the Scorekeeping Tent after the race is complete.
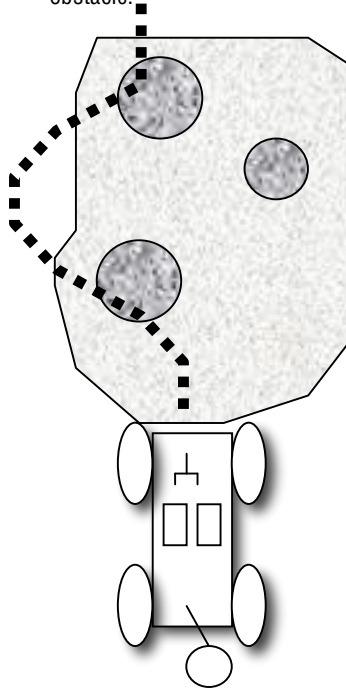
Obstacle Penalties

Correct:
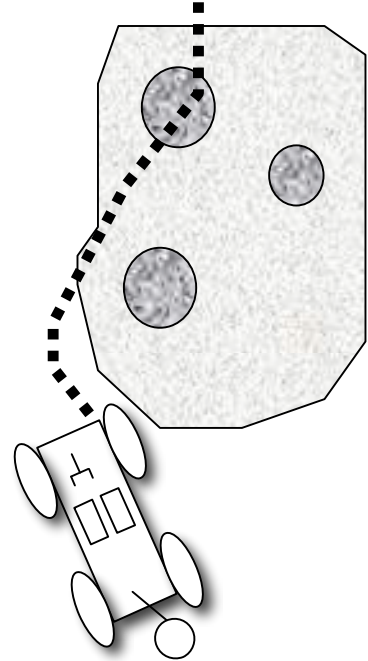Buggy enters and remains on obstacle center line. No rider touches the ground.
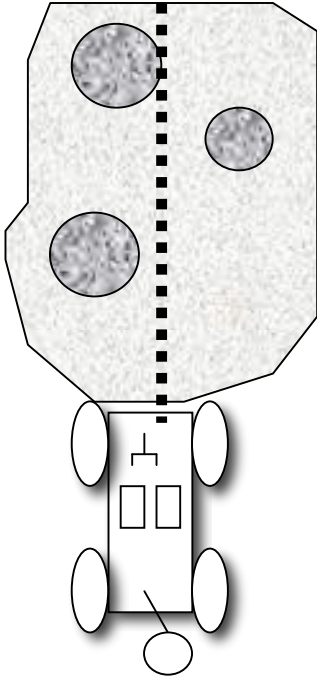
Obstacle Fault:
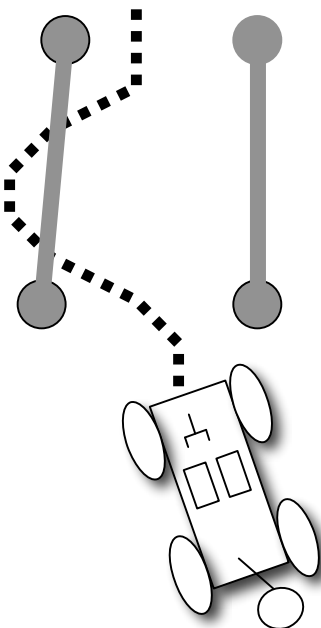Buggy enters the obstacle on the center line but veers off with the wheels leaving the obstacle.

Obstacle Fault:
Buggy enters the obstacle off of the center line with wheels off the obstacle but still attempts the obstacle.
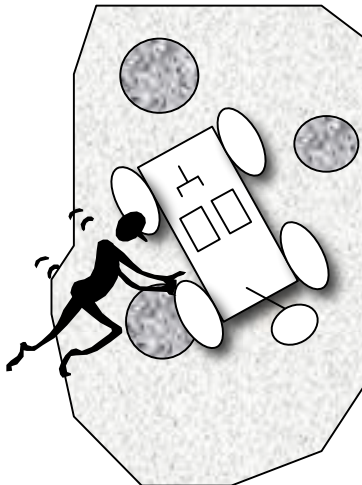
Obstacle Fault:
Buggy makes a significant impact with rope or cone.
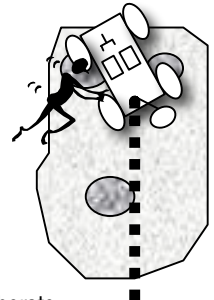
Ground Touch:
Rider steps out of buggy or touches the ground with hands or foot to gain advantage. The majority of the obstacle is completed in the buggy.
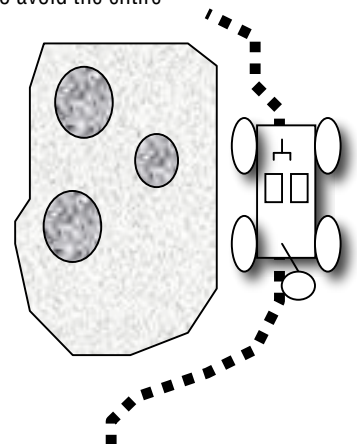
Ground Touch and Obstacle Fault
Rider steps out of buggy or touches the ground with hands or foot to gain advantage and pushes the buggy through avoiding the majority of the obstacle.

Disqualification:
Obvious and deliberate attempt to avoid the entire obstacle.

Obstacle Judge Sample Score Sheet

Obstacle Judging
High School Division

RUN #:

OBSTACLE #:

School Number/Name	Penalties (1:00 each)		Total Penalties (minutes)
	Obstacle Penalty	Ground Touch Penalty	
#1. Autauga County Technology Center (AL) I			
#2. C.E. King High School/AFJROTC (TX) I			
#3. Autauga County Technology Center (AL) II			
#4. C.E. King High School/AFJROTC (TX) II			
#5. Calloway County High School (KY)			
#6. Carlisle County High School (KY)			
#7. Columbia Academy (TN)			
#8. DeSoto High School (KS) I			
#9. Erie High School (KS) I			
#10. DeSoto High School (KS) II			
#11. Erie High School (KS) II			
#12. Fairhope High School (AL) I			
#13. Floresville High School (TX)			
#14. Fairhope High School (AL) II			
#15. Flinthills High School (KS) (Exhibition Only)			
#16. Franklin County High School (TN) I			
#17. Graves High School (KY) I			
#18. Franklin County High School (TN) II			
#19. Graves High School (KY) II			
#20. Huntsville Center for Technology (AL) I			
#21. Huntsville High School (AL)			
#22. Huntsville Center for Technology (AL) II			
#23. Indianapolis Public Schools (IN) I			

Pertinent Rules and General Rules for Obstacle Judging are included in the folder.

Scorekeeper

Scorekeepers are responsible for tracking the penalties and recording run times into an electronic spreadsheet from all of the positions. There are 8 Scorekeepers per shift.

Scorekeepers should report to the Scorekeeping Tent for any items needed for the race.

1. Individual Team Scorekeepers (set of 2-3 individuals)
    Each person will take a turn in following the entire scoring process for a single team. The buggies will be started in order of their team number. The Scorekeeper will listen to the walkie-talkie for the following scores and record them on the Individual Team Score sheet:

    Pre-Race (from Assembly Judges)
    Volume Penalty
    Carry (weight)   penalty
    15 in clearance penalty
    Assembled size width (4 ft) penalty
    Assembly Time
    Initial Condition (from Initial Condition Judge)
    Possible Late Start Penalty (from Late Start Judge)
    Obstacle/Ground touch penalties (from Obstacle Judges)
    Run Time (from Timer)
    Final Condition penalties (from Final Condition Judge)

    As one buggy passes Obstacle 11 (halfway point of the course) a second buggy will begin. A second individual Scorekeeper will follow this buggy from assembly to final condition. (Buggies are not assembled before their second run, only their first run.)

2. The individual Scorekeepers' information will be delivered by the Score Recorder from their table to those working with the Excel Spreadsheets at the adjacent table. One laptop will be designated the Primary Score Collection PC, and a second laptop the Secondary (back-up) Score Collection PC. The score sheets will first go to the Primary Score Collection PC, and then to the Secondary Score Collection PC group.

    Penalties, assembly time, and run time from the score sheets will be input into the spreadsheet. After entry, the sheets will be placed by the Secondary Group in the provided three-ring binder. This binder will be provided to teams for review if necessary.

    After the completion of a run, or during a scheduled break, the results of the race to that point will be printed, and placed on the scoreboard by the Score Recorder. The Score Recorder will record the time of the day that the scores are posted.

3. Teams have up to 30 minutes after a score is reported to protest their score. At the end of the race, final scores will be reported, and there will be the required 30 minute wait. Scorekeepers are asked to stay until this period ends, and the names of the top three winning teams are presented to the Awards Committee for the awards ceremony.

Scorekeeper Sample Score Sheet

NASA Great Moonbuggy Race
Individual Team Score Sheet

Team #: _____   **Run #:** _____

PENALTIES

DESCRIPTION	PENALTY	TOTAL
Pre-Race:		
Volume (or disqualification)	2:00	_____
Carry (weight)	2:00	_____
15 in clearance	2:00	_____
Assembled size width (4 ft)	2:00	_____
PRE-RACE TOTAL		_____

Assembly Time: _____

		Total
Initial Condition – 7 items :30 ea (*times # of penalties*)		_____

(Circle Penalty Item) (Fenders, US Flag, Simulated: 1st Battery, 2nd Battery,
    High Gain Antenna, TV Camera, Radio/Display Console)

Late Start:	Amt. Of Penalty	Total
Late start (5 - 10 minutes)	4:00	_____
(>10 minutes disqualification)		

Race:	Amt. Of Penalty	Total
Obstacle (1-17) *(*Circle Obstacle of Penalty*)		
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 --1:00ea		_____
Ground contact *(*Circle Obstacle of Penalty*)		
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 --1:00ea		_____

Raw Run Time: _____

		Total
Final Condition – 7 items :30ea (*times # of penalties*)		_____

(Circle Penalty Item) (Fenders, US Flag, Simulated: 1st Battery, 2nd Battery,
    High Gain Antenna, TV Camera, Radio/Display Console)

Disqualification:

Safety (Safety Judges discretion)	_____
>10 minute late start	_____
Passenger (1 male, 1 female)	_____
Un-attempted obstacle	_____

THANK YOU
for helping
host NASA Great
Moonbuggy Race!